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DEPARTMENT OF ENERGY

National Nuclear Security Administration

Excess Uranium Management: Secretarial Determination of No Adverse Impact on the Domestic Uranium Mining, Conversion, and Enrichment Industries

AGENCY: National Nuclear Security Administration, Department of Energy

ACTION: Notice.

SUMMARY: On December 18, 2015, the Secretary of Energy issued a determination (“Secretarial Determination”) covering the lease of high-assay low enriched uranium for medical isotope production projects through the Department’s Uranium Lease and Take-Back Program (ULTB). The Secretarial Determination covers transfers of up to 500 kilograms uranium (kgU) per year of low enriched uranium (LEU) at up to 19.75 percent uranium-235 in the two years following approval of the determination to support molybdenum-99 production. For the reasons set forth in the Department’s “Analysis of Potential Impacts of Uranium Transfers on the Domestic Uranium Mining, Conversion, and Enrichment Industries,” which is incorporated into the Determination, the Secretary determined that these transfers will not have an adverse material impact on the domestic uranium mining, conversion, or enrichment industry.

FOR FURTHER INFORMATION CONTACT:

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SUPPLEMENTARY INFORMATION: The Department of Energy (DOE) holds inventories of uranium in various forms and quantities—including low-enriched uranium (LEU) and natural uranium—that have been declared as excess and are not dedicated to U.S. national security missions. Within DOE, the Office of Nuclear Energy (NE), the Office of Environmental Management (EM), and the National Nuclear Security Administration (NNSA) coordinate the management of these excess uranium inventories. NNSA down-blends excess highly-enriched uranium to high-assay low-enriched uranium—above the commercial level of 5 wt-% and up to about 19.75 wt-% of the isotope U-235—in support of its nonproliferation objectives and missions. Common applications of such high-assay materials are as fuels for domestic and foreign research reactors and as target materials for the production of medical isotopes.

This notice involves high-assay LEU transfers of this type to support molybdenum-99 producers in such applications. These transfers fulfill a directive in the American Medical Isotope Production Act of 2012 (Pub. L. 112–239, Division C, Title XXXI, Subtitle F, 42 U.S.C. § 2065) for the Department to establish a program to make low enriched uranium available, through lease contracts, for irradiation for the production of molybdenum-99 for medical uses. These transfers also support U.S. nuclear nonproliferation initiatives, by providing a path for down-blended highly enriched uranium (HEU) and encouraging the use of LEU in civil applications in lieu of HEU.

These transfers are conducted in accordance with the Atomic Energy Act of 1954 (42 U.S.C. § 2011 et seq., “AEA”), as amended, and other applicable law. Specifically, Title I, Chapters 6 and 14 of the AEA authorize DOE to transfer special nuclear material; LEU is a type of special nuclear material. The USEC Privatization Act (Pub. L. 104-134, 42 U.S.C. § 2297h et seq.) places certain limitations on DOE’s authority to transfer uranium from its excess uranium inventory. Specifically, under section 3112(d) of the USEC Privatization Act (42 U.S.C. § 2297h-10(d)), DOE may make certain transfers of natural or low-enriched uranium if the Secretary determines that the transfers “will not have an adverse material impact on the domestic uranium mining, conversion or enrichment industry, taking into account the sales of uranium under the Russian Highly Enriched Uranium Agreement and the Suspension Agreement.”

On December 18, 2015, the Secretary of Energy issued a determination (“Secretarial Determination”) covering the lease of high-assay low enriched uranium for medical isotope production. The Secretarial Determination covers leases of up to the equivalent of 500 kilograms of LEU at up to 19.75 percent uranium-235 per year for two years following approval of the determination to support molybdenum-99 producers. The Secretary based his conclusion on the Department’s “Analysis of Potential Impacts of Uranium Transfers on the Domestic Uranium Mining, Conversion, and Enrichment Industries,” which is incorporated into the determination. The Secretary considered, *inter alia*, the requirements of the USEC Privatization Act of 1996 (42 U.S.C. § 2297h et seq.), the nature of uranium markets, and the current status of the domestic uranium industries, as well as sales of uranium under the Russian HEU Agreement and the Suspension Agreement.

Issued in Washington, DC.

Anne M. Harrington,

Deputy Administrator for Defense Nuclear Nonproliferation,

National Nuclear Security Administration.

Set forth below is the full text of the Secretarial Determination.

SECRETARIAL DETERMINATION FOR THE SALE OR TRANSFER OF URANIUM

I determine that the lease of up to the equivalent of 500 kgU of 19.75%-assay low enriched uranium per calendar year to support the development and establishment of molybdenum-99 production capabilities will not have an adverse material impact on the domestic uranium mining, conversion, or enrichment industry. I base my conclusions on the Department's "Analysis of Potential Impacts of Uranium Transfers on the Domestic Uranium Mining, Conversion, and Enrichment Industries," which is incorporated herein. As explained in that document, I have considered, inter alia, the requirements of the USEC Privatization Act of 1996 (42 U.S.C. § 2297h et seq.), the nature of uranium markets, and the current status of the domestic uranium industries. I have also taken into account the sales of uranium under the Russian HEU Agreement and the Suspension Agreement.

Date: December 18, 2015.

Ernest J. Moniz,

Secretary of Energy

Analysis of Potential Impacts of Uranium Transfers on the Domestic Uranium Mining, Conversion, and Enrichment Industries

I. Introduction

A. Legal Authority

DOE manages its excess uranium inventory in accordance with the Atomic Energy Act of 1954 (42 U.S.C. § 2011 et seq., “AEA”), as amended, and other applicable law. Specifically, Title I, Chapters 6 and 14 of the AEA authorize DOE to transfer special nuclear material. Low enriched uranium (LEU) is a type of special nuclear material.

The USEC Privatization Act (Pub. L. 104-134, 42 U.S.C. § 2297h et seq.) places certain limitations on DOE’s authority to transfer uranium from its excess uranium inventory. Specifically, under section 3112(d) of the USEC Privatization Act (42 U.S.C. § 2297h-10(d)), DOE may make certain transfers of natural or low-enriched uranium if the Secretary determines that the transfers “will not have an adverse material impact on the domestic uranium mining, conversion or enrichment industry, taking into account the sales of uranium under the Russian Highly Enriched Uranium Agreement and the Suspension Agreement.” (42 U.S.C. § 2297h-10(d)(2)(B)). The validity of any determination under this section is limited to no more than two calendar years subsequent to the determination (see Section 306(a) of Division D, Title III of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub. L. 113-235)).

B. Transactions considered in this determination.

The American Medical Isotopes Production Act of 2012 (Pub. L. 112–239, Division C, Title XXXI, Subtitle F, 42 U.S.C. § 2065, “AMIPA”) directs the Department to establish a program to lease LEU for irradiation to produce molybdenum-99 in the United States without the

use of highly enriched uranium (HEU). This Uranium Lease and Take Back (ULTB) program will involve providing high-assay LEU (LEU enriched above 5 wt-%, but below 20 wt-% of U-235) to parties engaged in commercial production of molybdenum-99 in the United States for medical uses. As directed in AMIPA, the leased material will be used as either driver fuel for reactors employed in medical isotope production, as target material for irradiation and extraction of molybdenum-99, or both. The exact uses and designs vary by producer, but fission-based production usually involves fabrication of uranium targets for irradiation in a reactor, followed by chemical processing to extract the Mo-99 for packaging into a generator and delivery to a radiopharmacy.

The materials considered in this analysis will be provided during calendar years 2016 and 2017 and will consist of no more than 500 kgU enriched over 5 and up to 19.75 wt-% of the isotope U-235 in any calendar year.¹ Assuming a tails assay of 0.20 wt-% U-235, it would require approximately 19,100 kgU of natural uranium hexafluoride and approximately 22,600 separative work units (“SWU”) to produce that quantity of 19.75 wt-% LEU.

II. Analytical Approach

This analysis evaluates two forecasts: one reflecting the state of the domestic uranium industries if DOE goes forward with these transactions, and one reflecting the state of the domestic uranium industries if DOE does not go forward with them. DOE compares these two forecasts to determine the relevant impacts on the domestic uranium industries. In conducting this comparison, DOE has developed a set of factors that this analysis considers in assessing whether DOE’s uranium transfers will have an “adverse material impact” on the domestic uranium mining, conversion, or enrichment industry:

¹ If any leases include material at an assay other than 19.75 wt-%, the amount will be converted so that the total amount in any calendar year is equivalent to no more than 500 kgU at 19.75 wt-%.

1. Prices
2. Production at existing facilities
3. Employment levels in the industry
4. Changes in capital improvement plans and development of future facilities
5. Long-term viability and health of the industry
6. Russian HEU Agreement and Suspension Agreement

While no single factor is dispositive of the issue, DOE believes that these factors are representative of the types of impacts that the proposed leases may have on the domestic uranium industries. Not every factor will necessarily be relevant on a given occasion or to a particular industry; DOE intends this list of factors only as a guide to its analysis.

III. Assessment of Potential Impacts

There is currently no commercial supplier of high-assay LEU on the open market. Modern enrichment facilities are technologically able to produce such materials. However, due to the economics of enrichment, owners and operators of such enrichment facilities have chosen not to pursue enrichment of high-assay LEU. Doing so would entail investment both for tooling up for higher enrichment and for regulatory licensing (chiefly from the Nuclear Regulatory Commission). Commercial power market projections of demand in the nuclear medicine industry for LEU in future years range from tens to hundreds of kilograms. Compared to the demand of the commercial power market, which requires thousands of metric tons of enriched uranium and associated conversion services, the production of small amounts of high-assay material is not likely to be economically viable for private industry. Additionally, with the closing of the Paducah Gaseous Diffusion Plant in 2013, the only remaining operational uranium enrichment facility in the U.S. is that operated by Louisiana Energy Services, LLC, which is

licensed by the Nuclear Regulatory Commission to possess uranium only up to 5 wt-% U-235,² meaning no domestic commercial uranium enrichment facility is currently licensed to possess the high-assay LEU contemplated for lease.

There is currently no foreign commercial producer or supplier of high-assay low enriched uranium for use in domestic research reactors or medical isotope production applications. The high-assay LEU that is produced internationally, for example to convert Russian-supplied reactors from highly enriched uranium (HEU) cores, is noncommercially produced by state-owned enterprises for official purposes via downblending excess HEU.

It is also not feasible for commercial molybdenum-99 producers to use commercial available assays of LEU (i.e. LEU enriched to 5 wt-% U-235 or less) instead of high-assay LEU. Given the specialized uses, designs, and regulatory requirements of the fuels and targets used for these isotope production purposes, it would be technologically and financially infeasible for reactor operators to replace DOE-sourced high-assay LEU by converting the reactors to use commercial-assay LEU; likewise fabricating targets using commercial-assay LEU would limit their effectiveness sufficiently to make them uneconomical. Therefore, low-assay LEU use would prevent the reactor or target from achieving the same performance or efficiency and thus from being used for their intended purposes.

Given the lack of domestic commercial production or supply of such materials and challenges to using or finding an alternative supply, an analysis of the impact of the proposed leases based on an assessment of the six factors listed in Section II is straightforward. Since the DOE material would not supplant material available on the commercial market, it would not displace primary production of uranium concentrates, conversion services, or enrichment

² U.S. Nuclear Regulatory Commission, *Materials License*. License Number SNM-2010, Amendment 57, Docket Number 70-3103

services. Thus, there will be no meaningful impact on the domestic uranium industries with respect to any of the factors.

Even if the DOE leases would displace production among the domestic uranium mining, conversion, or enrichment industry, the amount would be so small that the effects would be minimal. With respect to the three uranium industries, to produce the amount of LEU in the proposed leases from primary production would require about 50,000 pounds of uranium concentrates (U_3O_8), 19,100 kgU of conversion services, and approximately 22,600 SWU of enrichment services. By comparison, the entire global fleet of nuclear reactors is expected to need in 2015 approximately 160 million pounds U_3O_8 , 56 million kgU of conversion services, and about 45 million SWU.³ For further comparison, the U.S. uranium mining industry produced approximately 4.9 million pounds of U_3O_8 in 2014.⁴ The domestic conversion industry consists of only one facility. In recent years, that facility has produced between 11 and 12 million kgU. As mentioned above, there is only one currently operating enrichment facility in the U.S. The total capacity of that facility is currently about 3.7 million SWU. The Suspension Agreement with the Russian Federation allows for the sale of Russian natural uranium and SWU into the United States with restrictions ranging between 11.9 and 13.4 million pounds U_3O_8 equivalent per year between 2014 and 2020 (73 FR 7705 at 7706, Feb. 11, 2008).⁵

³ These estimates of global requirements come from an analysis prepared by Energy Resources International, Inc. (ERI). This report is available at <http://www.energy.gov/ne/downloads/excess-uranium-management>. DOE tasked ERI to prepare this analysis to assess the potential effects on the domestic uranium mining, conversion, and enrichment industries of the introduction into the market of uranium transfers that are not the subject of this assessment. ERI develops its requirements forecasts for various customers. Because of ERI's general expertise in the uranium markets and contacts with market participants, DOE believes ERI's general market information is reliable.

⁴ EIA, Domestic Uranium Production Report Q3 2015, 2 (October 2015). Based on data from the first three quarters of 2015, uranium concentrate production is down in the United States compared to the corresponding quarters of 2014. Even accounting for this decrease, the effect of an additional 50,000 pounds U_3O_8 would be minimal. In just the first three quarters of 2015, the domestic uranium mining industry produced over 2.7 million pounds U_3O_8 . *Id.*

⁵ The Russian HEU Agreement allowed for the sale of LEU derived from Russian downblended HEU. This agreement ended in December 2013.

Given how small these DOE leases would be compared to global reactor requirements, domestic production, and imports from the Russian Federation under the Suspension Agreement, DOE concludes that leases at this level would have almost no impact on the domestic uranium mining, conversion, or enrichment industry with respect to any of the six factors listed in Section II.

DOE recently issued a determination that certain transfers of natural uranium in exchange for cleanup services at the Portsmouth Gaseous Diffusion Plant and of LEU in exchange for downblending services will not have an adverse material impact on the domestic uranium industries. The analysis supporting that determination also considered various other past transfers, the uranium from which may still be affecting markets, and the impacts of the Russian HEU Agreement and Suspension Agreement (80 Fed. Reg. 26,366 at 26,385). DOE also issued a determination that the transfer of up to the equivalent of 25 kgU of 19.75% assay LEU per calendar year to support the development and demonstration of molybdenum-99 production capabilities will not have an adverse material impact on the domestic uranium industries (80 Fed. Reg. 65,727). In reaching the conclusion that leases of up to 500 kgU per year of high-assay LEU will have a minimal impact on the domestic uranium industries, DOE takes account of the various transfers assessed for its recent determinations.

IV. Conclusion

For the reasons discussed above, these leases will not have an adverse material impact on the domestic uranium mining, conversion, or enrichment industry, taking into account the Russian HEU Agreement and Suspension Agreement.

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